

What Is Claimed Is:

1. A diode-pumped solid-state laser having an asymmetrical optical resonator provided with at least two resonator mirrors, inside said resonator being provided at least one thermal lens having an optical refractive power D and having two principal planes respectively and said resonator being definable by the following stability criteria:

$$0 < G_1 \cdot G_2 < 1$$

with $G_1 = 1 - L^*/R_1 - D \cdot d_2$

$$G_2 = 1 - L^*/R_2 - D \cdot d_1$$

and $L^* = d_1 + d_2 - D \cdot d_1 \cdot d_2$

d_1, d_2 the distances of the resonator mirror from the principal planes of the thermal lens

R_1, R_2 the radii of curvature of the resonator mirrors

wherein the values d_1 , d_2 , R_1 and R_2 are selected in such a manner that the following critical refractive powers D_I, D_{II}, D_{III} and D_{IV} , for which

$$D_I = -\frac{1}{R_1 - d_1} - \frac{1}{R_2 - d_2}, \quad D_{II} = \frac{1}{d_2} - \frac{1}{R_1 - d_1}, \quad D_{III} = \frac{1}{d_1} - \frac{1}{R_2 - d_2}, \quad D_{IV} = \frac{1}{d_1} + \frac{1}{d_2}$$

applies, the following equations are fulfilled:

$$D_{II} - D_I = D_{IV} - D_{III} \geq 8 \text{ dptr.}$$

$$|D_{III} - D_{II}| \geq 2 \text{ dptr.}$$

2. The diode-pumped solid-state laser according to claim 1,
wherein an intracavity quality-switch or an extracavity modulator is provided.
3. The diode-pumped solid-state laser according to claim 2,
wherein said quality -switch is an intracavity acouso-optical or electro-optical Q-switch.
4. The diode-pumped solid-state laser according to claims 1 to 3,
wherein said asymmetrical optical resonator is provided with a convex-plane, convex-concave or convex-convex resonator construction.
5. The diode-pumped solid-state laser according to one of the claims 1 to 4,
wherein provided is an intracavity laser medium in the form of at least one laser crystal doped with one or a multiplicity of the following doping substances: Nd, Yb, Cr, Tm, Ho or Er.
6. The diode-pumped solid-state laser according to claim 5,
wherein said laser crystal comprises the following doped crystals: Nd:YAG, Nd:YVO₄, Nd:YLF, Nd:GVO₄, Nd:YPO₄, Nd:BEL, Nd:YALO, Nd:LSB, Yb:YAG, Yb:FAB, Cr:LiSAF, Cr:LiCAF, Cr:LiSGAF, Cr:YAG, Tm-Ho:YAG, Tm-Ho:YLF, Er:YLF or Er:GSGG
7. The diode-pumped solid-state laser according to claim 5 or 6,
wherein said laser crystal possesses strong thermal optical focussing properties and represents said thermal lens inside said resonator.
8. The diode-pumped solid-state laser according to one of the claims 1 to 7,
wherein at least one diode laser unit is provided as said pumped-light source, whose pumped light is directed or deflected in longitudinal direction to the optical axis of said thermal lens.

9. The diode-pumped solid-state laser according to one of claims 1 to 8, **wherein** using a Nd:YVO₄ laser crystal and pumped-light power of at least 10 W, the following peak pulse powers PP are attainable based on the pulse repetition frequency RF, at which the solid-state laser is operatable:

RF[kHz]	PP[kW]
10	>60
30	>30
60	>10
90	>5

10. The diode-pumped solid-state laser according to claim 9, **wherein** the laser pulses emitted by said solid-state laser have the following pulse widths PW at pulse repetition frequencies RF:

RF[kHz]	PW[ns]
10	~7
20	~10
30	~14
50	~18
75	~22
100	~28
150	~35